Development and Evaluation of Algorithms for Online Distributed Virtual Network Function Deployment and Consolidation

Network Function currently → Virtual Network Functions, VNFs. This enables far greater flexibility and, consequently, comes with new optimization problems. One important part of these problems is to decide how many of these VNF instances are needed, and where they should be placed. Together with various constraints (bandwidth, CPU capacities, ...) and objectives (minimize costs, delays, ...), these questions form an NP-hard optimization problem.

In this particular work, the online version of this problem shall be investigated, i.e., new instances are created and removed from the network during its operation, as new traffic demands arrive or leave the network. The aim is to design algorithms that are able to make these decisions locally (i.e., no central decision unit) and to evaluate their performance with respect to chosen objectives, for example by means of a simulation.

The student shall (among other things)
- formalize the problem and its context,
- outline its relation to existing, related approaches,
- develop optimization algorithms for VNF placement and removal,
- define appropriate measures for the quality of attained placements,
- evaluate the placement quality by means of these measures (→ discrete event simulation),
- and interpret attained results.

Especially, an algorithm should be implemented that identifies the list of flows to migrate and re-route in order to improve an infeasible or non-optimal placement and routing with the minimum amount of changes.

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